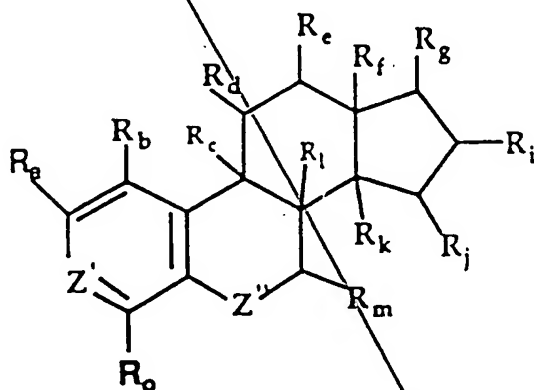


Claims

1. A method for treating a mammalian disease characterized by abnormal cell mitosis, said method comprising administering to a mammal a cell-mitosis-inhibiting compound of the formula below, said compound being administered in an amount sufficient to inhibit cell mitosis:



wherein:

I. R_a-R_o are defined as follows:

A) each R_a, R_b, R_c, R_d, R_e, R_f, R_g, R_h, R_i, R_j, R_k, R_l, R_m, R_o, independently is -R₁, -OR₁,

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12 $-\text{OCOR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2, -\text{Br}, \text{ or } -\text{I};$ and R_g
 13 is $-\text{R}_1, -\text{OR}_1, -\text{OCOR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2, -\text{Br},$
 14 $-\text{I}, \text{ or } -\text{C}\equiv\text{CH};$

15 or

16 B) each $\text{R}_a, \text{R}_b, \text{R}_c, \text{R}_f, \text{R}_k, \text{R}_l, \text{R}_o,$
 17 independently is $-\text{R}_1, -\text{OR}_1, -\text{OCOR}_1, -\text{SR}_1,$
 18 $-\text{F}, -\text{NHR}_2, -\text{Br}, \text{ or } -\text{I};$ and each $\text{R}_d, \text{R}_e, \text{R}_i,$
 19 $\text{R}_j, \text{R}_m,$ independently is $=\text{O}, -\text{R}_1, -\text{OR}_1,$
 20 $-\text{OCOR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2, -\text{Br} \text{ or } -\text{I};$ and R_g
 21 is $=\text{O}, -\text{R}_1, -\text{OR}_1, -\text{OCOR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2,$
 22 $-\text{Br}, -\text{I}, \text{ or } -\text{C}\equiv\text{CH};$

23 and

24 II. Z' is defined as follows:

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 27 A) Z' is $\text{X},$ where X is $>\text{COR}_1, \overset{\text{O}}{\underset{|}{>\text{CC}-\text{R}_1}},$

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 29 $\overset{\text{O}}{\underset{|}{>\text{CC}-\text{OR}_1}}, \overset{\text{OH}}{\underset{|}{>\text{CC}-\text{R}_1}}, \overset{\text{OH}}{\underset{|}{>\text{CC}-\text{OR}_1}};$
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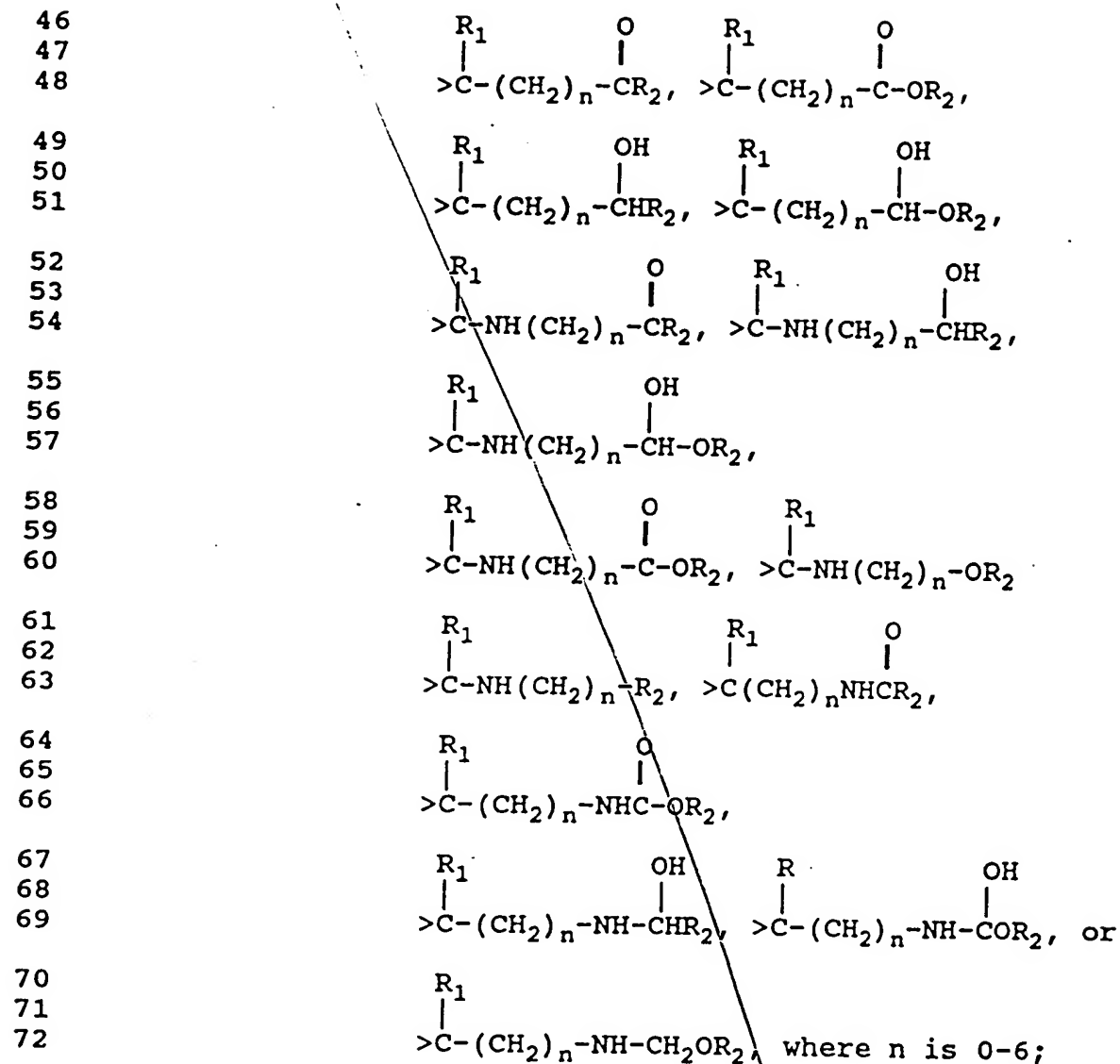
31 or

32 B) Z' is $=\text{C}-\text{X}'-$ or $-\text{X}'-\text{C}=,$ where R_n
 33 $\underset{|}{\text{R}_n} \qquad \qquad \underset{|}{\text{R}_n}$
 34
 35 is $-\text{R}_1, -\text{OR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2, -\text{Br} \text{ or } -\text{I};$
 36 and X' is $\text{X},$ as defined above; or X' is
 37 $>\text{C}=\text{O};$

38 and

39 III. Z'' is defined as follows:

40
 41
 42 A) Z'' is $\text{Y},$ where Y is $-\text{O}-, \overset{\text{R}_1}{\underset{|}{-\text{N}-}}, >\text{CHR}_1,$
 43
 44 $\overset{\text{R}_1}{\underset{|}{>\text{C}=\text{O}}, >\text{C}-(\text{CH}_2)_n\text{OR}_2},$
 45



73 or

74 B) Z" is -Y-CH- or -CH-Y- where R_p
75 $\begin{array}{c} | \\ R_p \end{array}$ $\begin{array}{c} | \\ R_p \end{array}$
76
77 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$;

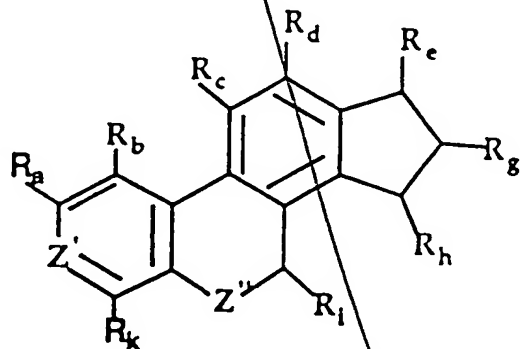
78 and

79 IV. provided that when each $R_b, R_c, R_d, R_e, R_i, R_j, R_k,$
80 R_l, R_m and R_o is H;
81 R_f is $-CH_3$;

82 R_g is -OH;
 83 Z' is >COH; and
 84 Z'' is >CH₂;
 85 then R_a is not -H;
 86 where, in each formula set forth above, each R_1 and R_2
 87 independently is -H, or substituted or unsubstituted alkyl,
 88 alkenyl or alkynyl group of 1-6 carbons.

1 2. A method for treating a mammalian disease
 2 characterized by abnormal cell mitosis, said method
 3 comprising administering to a mammal a cell-mitosis-
 4 inhibiting compound of the formula below, said compound
 5 being administered in an amount sufficient to inhibit cell
 6 mitosis:

7



8 wherein:

9 I. R_a-R_k are defined as follows:

10 A) each $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$
11 independently is $-R_1, -OR_1, -OCOR_1, -SR_1,$
12 $-F, -NHR_2, -Br, \text{ or } -I$; and R_e is $-R_1, -OR_1,$
13 $-OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or $-C\equiv CH$;

14 or

15 B) each R_a, R_b, R_c, R_d, R_k , independently is
16 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, \text{ or }$
17 $-I$; and each R_e, R_h, R_i , independently is
18 $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, \text{ or }$
19 $-I$; and R_g is $=O, -R_1, -OR_1, -OCOR_1, -SR_1,$
20 $-F, -Br, -I$ or $-C\equiv CH$;

21 and

22 II. Z' is defined as follows:

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24
25 A) Z' is X , where X is $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1,$

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28 $>\overset{O}{\underset{|}{CC}}-OR_1, >\overset{OH}{\underset{|}{CC}}-R_1, >\overset{OH}{\underset{|}{C}}-C-OR_1;$

29 or

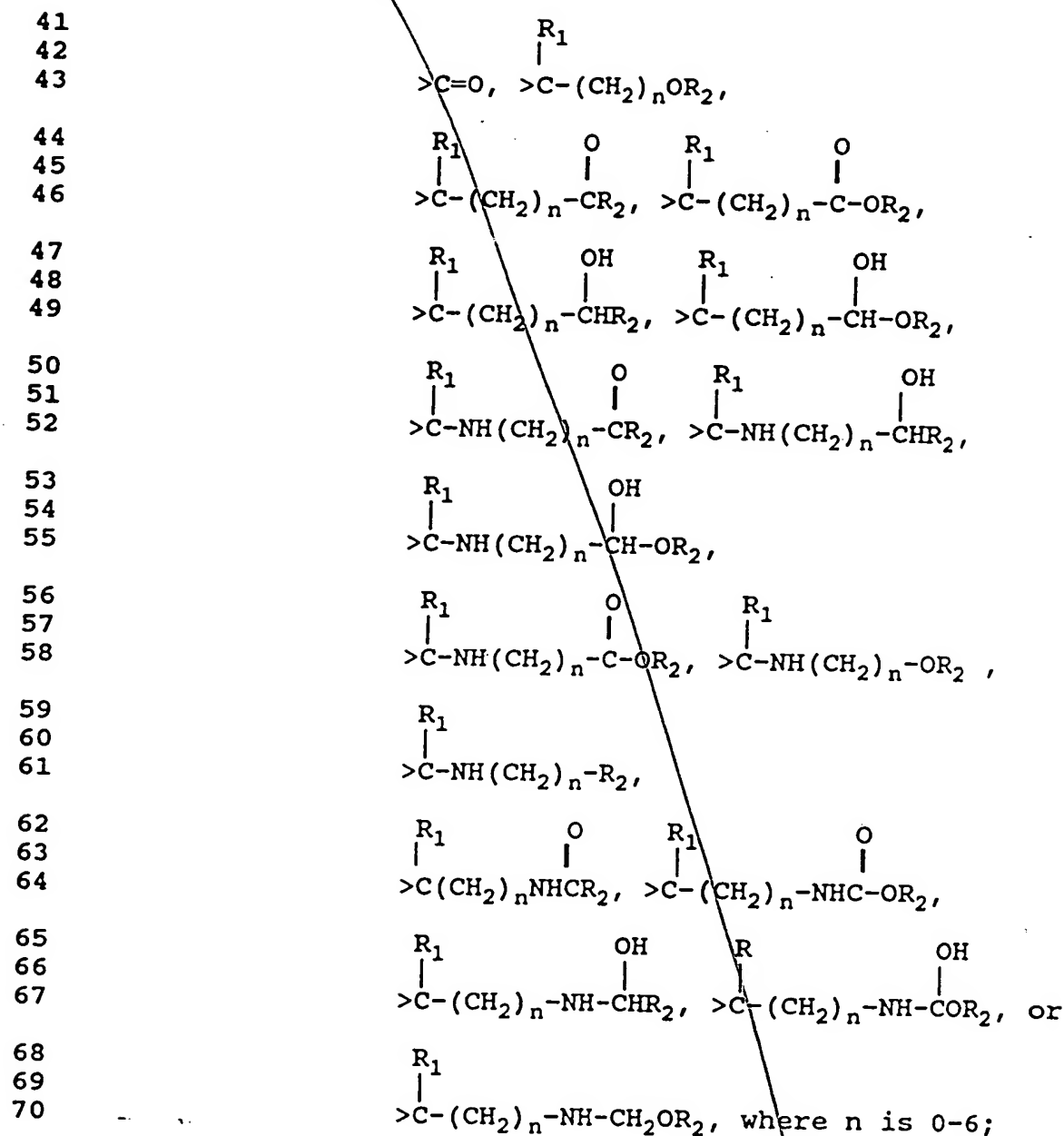
30 B) Z' is $=\underset{\underset{R_n}{|}}{C}-X'-$ or $-X'-\underset{\underset{R_n}{|}}{C}=$, where R_n

33 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$,
34 and X' is X , as defined above;
35 or X' is also $>C=O$;

36 and

37 III. Z'' is defined as follows:

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40 A) Z'' is Y , where Y is $-\overset{R_1}{\underset{|}{O}}-, -N-, >\underset{\underset{R_1}{|}}{CH}R_1,$



71 or

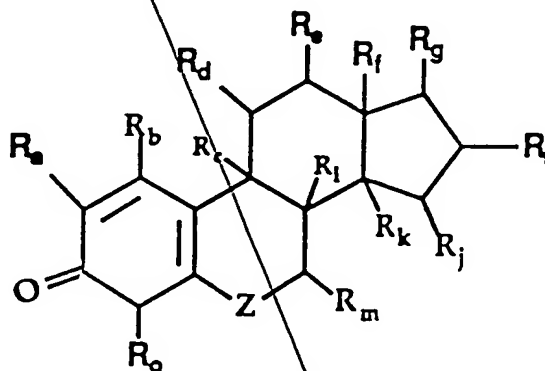
72 B) Z" is -Y-CH- or -CH-Y-, where R_p is

73 R_p R_p
74 $\text{-R}_1, \text{-OR}_1, \text{-SR}_1, \text{-F, -NHR}_2, \text{-Br or -I;}$
75

76 where, in each formula set forth above, each R_1 and R_2
77 independently is -H, or substituted or unsubstituted alkyl,
78 alkenyl or alkynyl group of 1-6 carbons.

1 3. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:

7



8 wherein:

9 I. R_a-R_o are defined as follows:

10 A) each $R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l,$
11 R_m, R_o independently is $-R_1, -OR_1, -OCOR_1,$
12 $-SR_1, -F, -NHR_2, -Br, -I$; and R_g is $-R_1,$
13 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or
14 $-C\equiv CH$;

15 or

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23 and

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II. Z is defined as follows:

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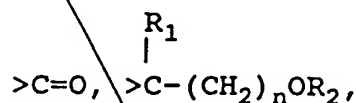
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A) Z is Y, where Y is $\overset{\text{R}_1}{\text{O}-}$, $\overset{\text{R}_1}{\text{N}-}$, >CHR_1 ,

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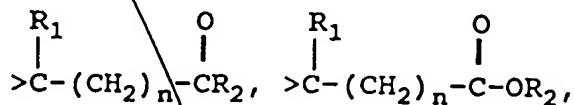
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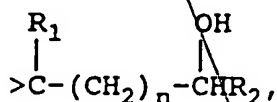
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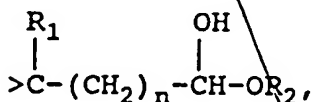
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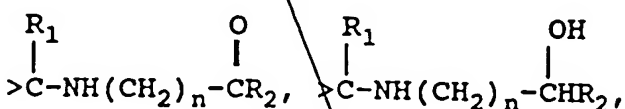
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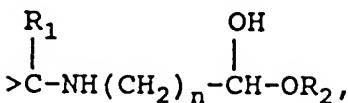
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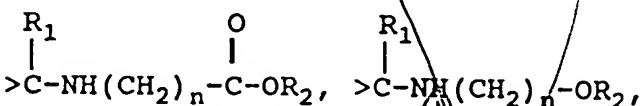
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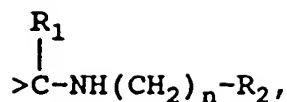
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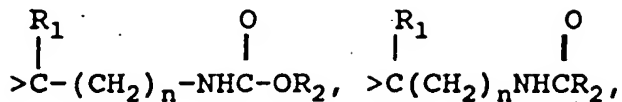
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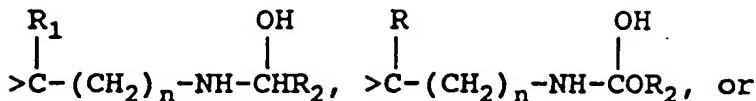
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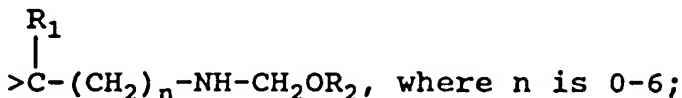
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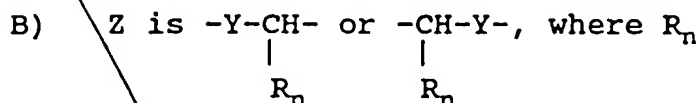


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62 or

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is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

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where, in each formula set forth above, each R_1 and R_2

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independently is $-H$, or substituted or unsubstituted alkyl,

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alkenyl or alkynyl group of 1-6 carbons.

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4. A method for treating a mammalian disease

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characterized by abnormal cell mitosis, said method

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comprising administering to a mammal a cell-mitosis-

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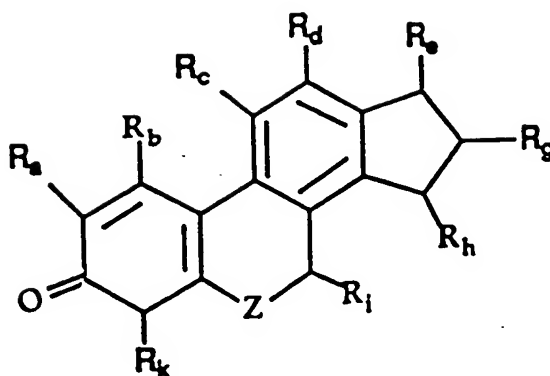
inhibiting compound of the formula below, said compound

5

being administered in an amount sufficient to inhibit cell

6

mitosis:



7 wherein:

8 I. R_a-R_k are defined as follows:

9 A) each $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$
 10 independently is $-R_1, -OR_1, -OCOR_1, -SR_1,$
 11 $-F, -NHR_1, -Br, \text{ or } -I$; and R_e is $-R_1, -OR_1,$
 12 $-OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

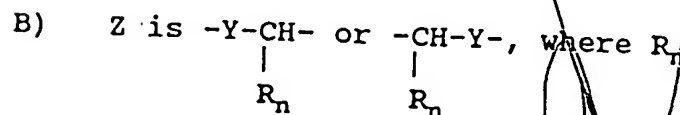
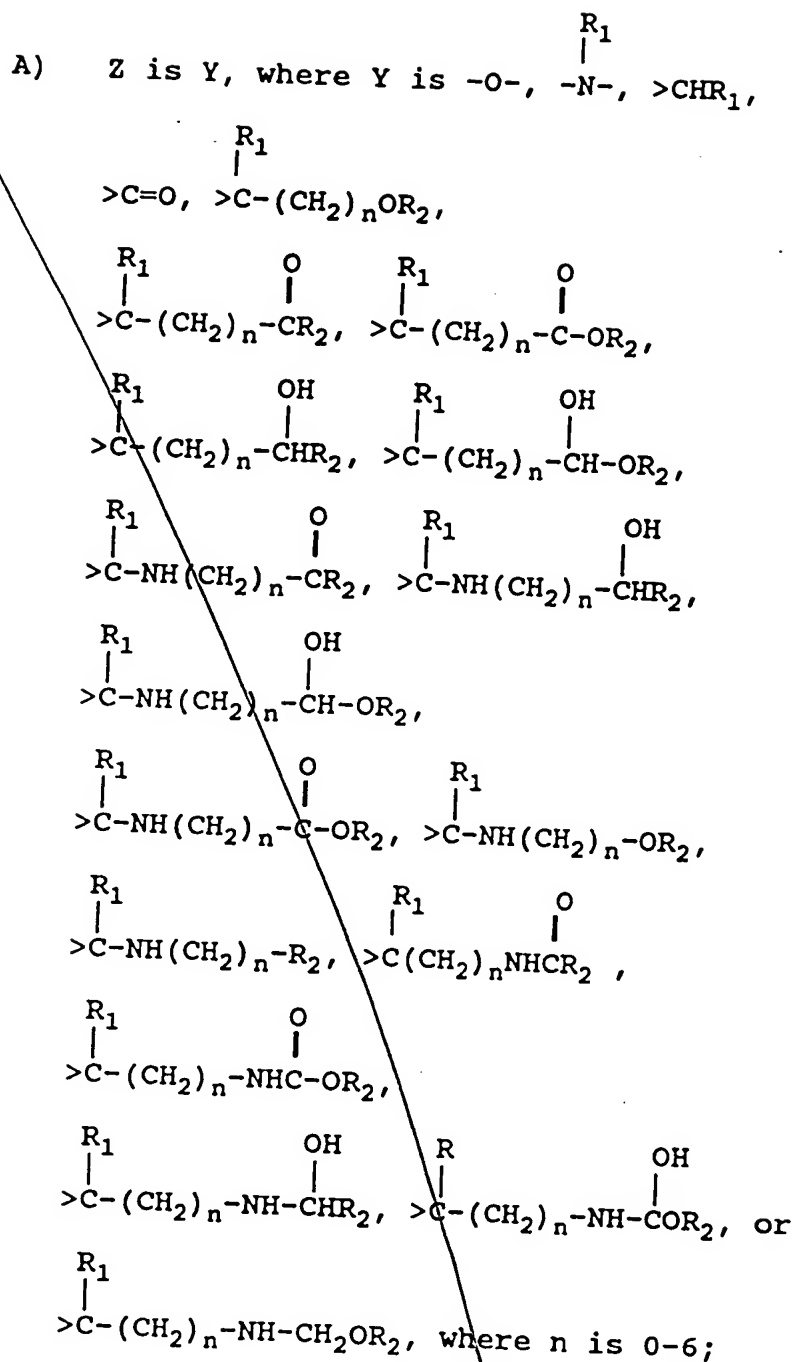
13 or

14 B) each R_a, R_b, R_c, R_d , independently is $-R_1,$
 15 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, \text{ or } -I$
 16 and each R_g, R_h, R_i, R_k independently is
 17 $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$
 18 or $-I$; and R_e is $=O, -R_1, -OR_1, -OCOR_1,$
 19 $-SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

20 and

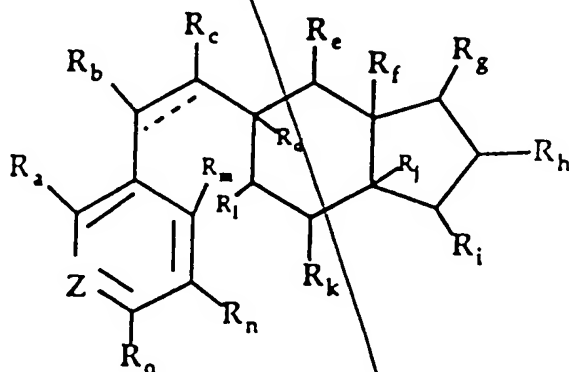
21 II. Z is defined as follows:

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59 is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;
60 where, in each formula set forth above, each R_1 and R_2
61 independently is $-H$, or substituted or unsubstituted alkyl,
62 alkenyl or alkynyl group of 1-6 carbons.

1 5. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:
7



8 wherein:

9 I. R_a-R_o are defined as follows:

10 A) each R_a , R_b , R_c , R_d , R_e , R_f , R_g , R_h , R_j , R_k ,
11 R_l , R_m , R_n , R_o independently is $-R_1$, $-OR_1$,
12 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i
13 is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$,
14 $-I$ or $-C\equiv CH$;

15 or

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23 or

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B) each $R_a, R_d, R_f, R_j, R_m, R_n, R_o$
independently is $-R_1, -OR_1, -OCR_1, -SR_1,$
 $-F, -NHR_2, -Br, \text{ or } -I$; and each $R_b, R_c, R_e,$
 R_g, R_h, R_k, R_l independently is $=O,$
 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or
 $-I$; and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1,$
 $-F, -Br, -I$ or $-C\equiv CH$;

31 II. Z is defined as follows:

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A) Z is X, where X is $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1, >\overset{O}{\underset{|}{CC}}-OR_1,$

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$\overset{OH}{\underset{|}{>CC}}-R_1, \overset{OH}{\underset{|}{>CC}}-OR;$

38 or

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B) Z is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$, where R_p

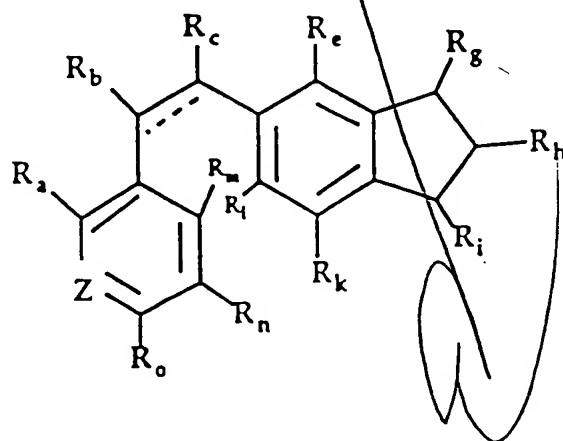
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is $-\text{R}_1$, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$ or $-\text{I}$;
and X' is X , as defined above;
or X' is $>\text{C}=\text{O}$;

45 where, in each formula set forth above, each R_1 and R_2
46 independently is $-\text{H}$, or substituted or unsubstituted alkyl,
47 alkenyl or alkynyl group of 1-6 carbons; and the bond
48 indicated by $\text{C}\cdots\text{C}$ is absent or, in combination with the $\text{C}-\text{C}$
49 bond, is the unit $\text{HC}=\text{CH}$.

1 6. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:

7



8 wherein:

9 I. R_a-R_o are defined as follows:

10 A) each $R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n,$
 11 R_o independently is $-R_1, -OR_1, -OCOR_1,$
 12 $-SR_1, -F, -NHR_2, -Br, \text{ or } -I$; and R_i is $-R_1,$
 13 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or
 14 $-C\equiv CH$;

15 or

16 B) each $R_a, R_e, R_l, R_m, R_n, R_o$ independently
 17 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
 18 $-I$ and each R_b, R_c, R_g, R_h is $=O, -R_1,$
 19 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$;
 20 and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$
 21 $-NHR_1, -Br, -I$ or $-C\equiv CH$;

22 or

23 C) each $R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o$
 24 independently is $-R_1, -OR_1, -OCOR_1, -SR_1,$
 25 $-F, -NHR_2, -Br, -I,$ and each R_h, R_l
 26 independently is $=O, -R_1, -OR_1, -OCOR_1,$
 27 $-SR_1, -F, -NHR_1, -Br$ or $-I$; and R_i is $=O,$
 28 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$
 29 or $-C\equiv CH$;

30 and

31 I. Z is defined as follows:

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 34 A) Z is X, where X is $\begin{array}{c} O \\ | \\ >COR_1, >CC-R_1, >CC-OR_1, \\ \\ OH \quad OH \\ | \quad | \\ >CC-R_1, >CC-OR; \end{array}$

38 or

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B) Z is $\begin{array}{c} \text{C}-\text{X}'- \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} -\text{X}'-\text{C}= \\ | \\ \text{R}_p \end{array}$, where R_p

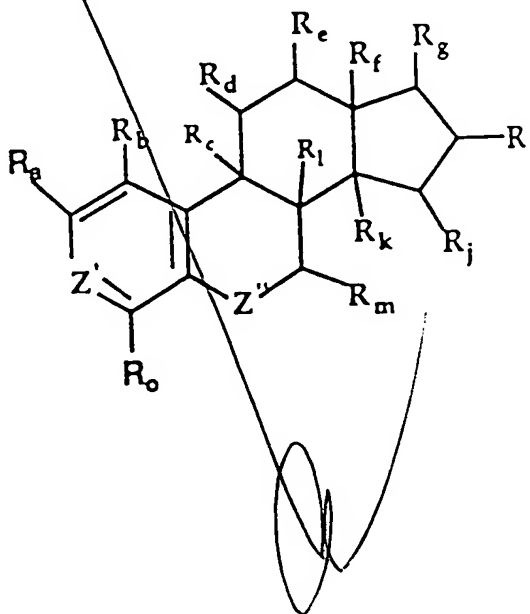
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is $-\text{R}_1$, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$ or $-\text{I}$,
and X' is X , as defined above;
or X' is $=\text{O}$;

45 where, in each formula set forth above, each R_1 and R_2
46 independently is $-\text{H}$, or substituted or unsubstituted alkyl,
47 alkenyl or alkynyl group of 1-6 carbons; and the bond
48 indicated by $\text{C}\cdots\text{C}$ is absent or, in combination with the $\text{C}-\text{C}$
49 bond is the unit $\text{HC}=\text{CH}$.

1
2
3

7. A compound of the general formula below, said
compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I. R_a-R_o are defined as follows:

6 (A) each $R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l,$
7 R_m, R_o , independently is $-R_1, -OR_1,$
8 $-OCOR_1, -SR_1, -F, -NHR_2, -Br$, or $-I$; and R_g
9 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
10 $-I$ or $-C\equiv CH$;

11 or

12 (B) each $R_a, R_b, R_c, R_f, R_k, R_l, R_o$, is $-R_1,$
13 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br$, or $-I$;
14 and each R_d, R_e, R_i, R_j, R_m , independently
15 is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2,$
16 $-Br$ or $-I$; and R_g is $=O, -R_1, -OR_1, -OCOR_1,$
17 $-SR_1, -F, -NHR_2, -Br, -I$ or $-C\equiv CH$;

18 and

19 II. Z' is defined as follows:

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22 A) Z' is X , where X is $\overset{O}{\underset{|}{>COR_1}}, \overset{O}{\underset{|}{>CC-R_1}},$

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24
25 $\overset{O}{\underset{|}{>CC-OR_1}}, \overset{OH}{\underset{|}{>CC-R_1}}, \overset{OH}{\underset{|}{>CC-OR_1}};$

26 or

27 B) Z' is $\underset{\underset{R_n}{|}}{=C-X'}-$ or $-X'-\underset{\underset{R_n}{|}}{C=}$, where R_n

28
29
30 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$;
31 or X' is X , as defined above; or
32 X' is $>C=O$;

33 and

34 III. Z'' is defined as follows:

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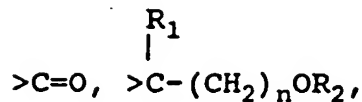
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A) Z" is Y, where Y is $\begin{array}{c} R_1 \\ | \\ -O-, -N-, >CHR_1, \end{array}$

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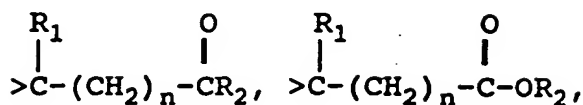
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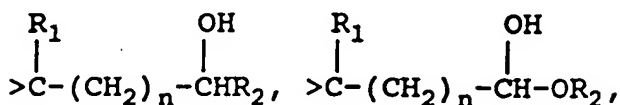
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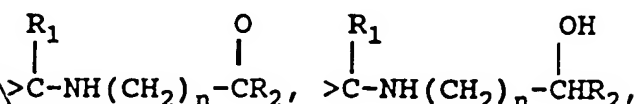
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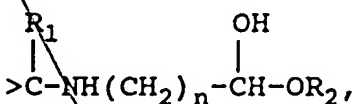
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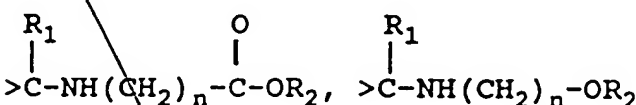
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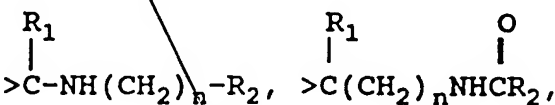
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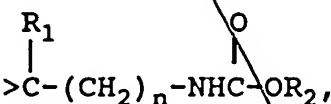
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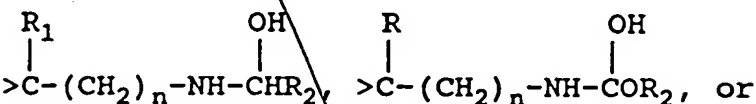
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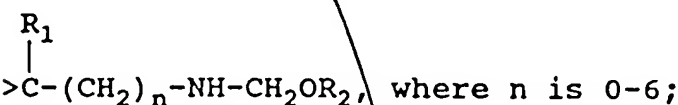
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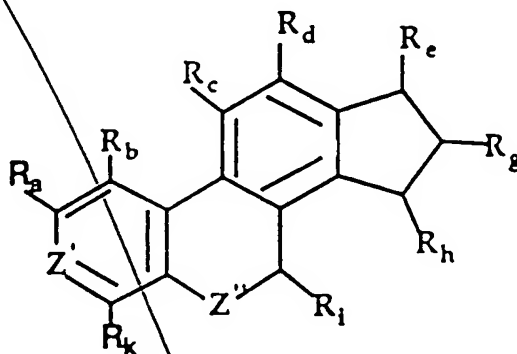
B) Z" is $\begin{array}{c} R_p \\ | \\ -Y-CH- \end{array}$ or $\begin{array}{c} R_p \\ | \\ -CH-Y- \end{array}$ where R_p

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- 72 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$;
73 provided that when:
74 3) each $R_b, R_c, R_d, R_e, R_j, R_k, R_l, R_m$ is $-H$;
75 R_f is $-CH_3$;
76
77 R_g is $-OH, -OCCH_3$;
78 R_i is $-H, -OH$, or $=O$;
79 R_o is $-H$ or $-Br$;
80 Z' is $>COH$; and
81 Z'' is $>CH_2$ or $-OH$; then
82 R_a is not $-F, -Br, -OH$ or $-H$;
83
84 and
85 4) each $R_b, R_c, R_d, R_e, R_i, R_j, R_k, R_l$,
86 R_m is $-H$;
87 R_f is $-CH_3$;
88 R_g is $-OH$; and
89 Z'' is $>CH_2$; then
90
91 Z' is not $>COCH_3$ or $>COCCH_3$; and
92 each R_a, R_o independently or together are
93 not $-OCH_3$ or $-H$;
94
95 and
96 5) each $R_c, R_e, R_j, R_k, R_l, R_m, R_o$ is $-H$;
97 R_a is $-H$ or $-OCH_3$;
98 R_b is $-H$ or $-CH_3$;
99 R_d is $-OH$;
100 R_f is $-CH_3$;
101 R_g is $=O$;
102 R_i is $-OH, =O$ or $-C\equiv CH$; and
103 Z'' is $>CH_2$; then
104
105 Z' is not $>COH, >COCCH_3$, or $-H$;
106

107 where, in each formula set forth above, each R_1 and R_2
108 independently is -H, or substituted or unsubstituted alkyl,
109 alkenyl or alkynyl group of 1-6 carbons.

1 8. A compound of the general formula below, said
2 compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I. R_a - R_k are defined as follows:

6 A) each R_a , R_b , R_c , R_d , R_g , R_h , R_i , R_k
7 independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$,
8 $-F$, $-NHR_2$, $-Br$, or $-I$; and R_e is $-R_1$, $-OR_1$,
9 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

10 or

11 B) each R_a , R_b , R_c , R_d , R_k is $-R_1$, $-OR_1$,
12 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and
13 each R_g , R_h , R_i , independently is $=O$,

14 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, \text{ or } -I;$
 15 and R_e is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$
 16 $-Br, -I$ or $-C\equiv CH;$

17 and

18 I. Z' is defined as follows:

19
 20
 21 A) Z' is X , where X is $>COR_1, >C_2\overset{\overset{O}{|}}{C}-R_1,$

22
 23
 24 $>C_2\overset{\overset{O}{|}}{C}-OR_1, >CC\overset{\overset{OH}{|}}{C}-R_1, >C\overset{\overset{OH}{|}}{C}-OR_1;$

25 or

26 B) Z' is $=C-X'-$ or $-X'-C=$, where R_n
 27 $\quad \quad \quad | \quad \quad \quad |$
 28 $\quad \quad \quad R_n \quad \quad \quad R_n$
 29 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I,$
 30 and X' is X , as defined above;
 31 or X' is also $>C=O;$

32 and

33 II. Z'' is defined as follows:

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 35
 36 A) Z'' is Y , where Y is $-O-, -N-, >CHR_1,$

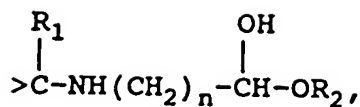
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 38
 39 $>C=O, >C\overset{\overset{R_1}{|}}{C}-(CH_2)_nOR_2,$

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 41
 42 $>C\overset{\overset{R_1}{|}}{C}-(CH_2)_n-CR_2, >C\overset{\overset{R_1}{|}}{C}-(CH_2)_n-C\overset{\overset{O}{|}}{C}-OR_2,$

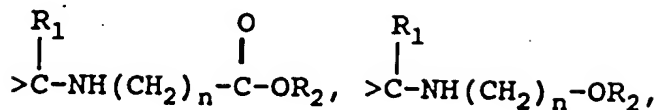
43
 44
 45 $>C\overset{\overset{R_1}{|}}{C}-(CH_2)_n-CH\overset{\overset{OH}{|}}{C}R_2, >C\overset{\overset{R_1}{|}}{C}-(CH_2)_n-CH\overset{\overset{OH}{|}}{C}-OR_2,$

46
 47
 48 $>C\overset{\overset{R_1}{|}}{C}-NH(CH_2)_n-CR_2, >C\overset{\overset{R_1}{|}}{C}-NH(CH_2)_n-CH\overset{\overset{OH}{|}}{C}R_2,$

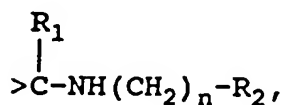
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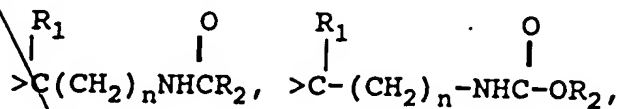
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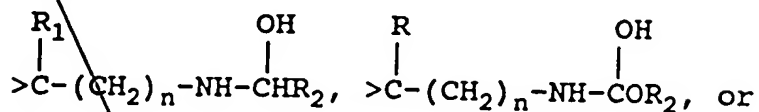
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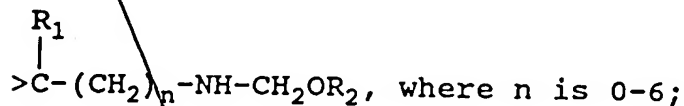
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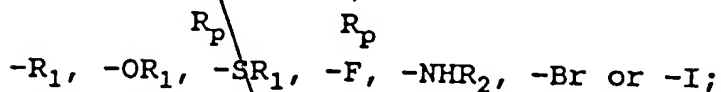


67 or

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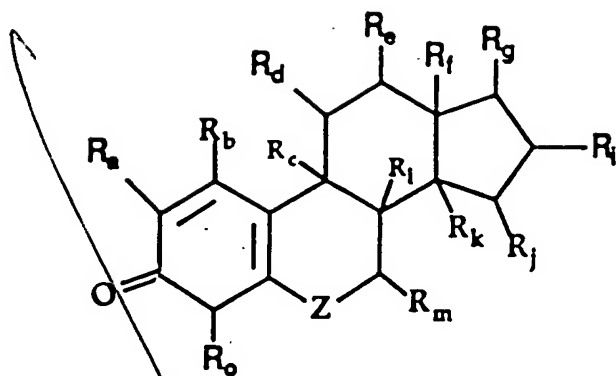
B) Z" is -Y-CH- or -CH-Y-, where R_p is

71
72



72 where, in each formula set forth above, each R₁ and R₂
73 independently is -H, or substituted or unsubstituted alkyl,
74 alkenyl or alkynyl group of 1-6 carbons.

1 9. A compound of the general formula below, said
2 compound being a cell-mitosis-inhibiting compound:



3 wherein:

4 I. R_a-R_o are defined as follows:

5 A) each $R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l,$
 6 R_m, R_o independently is $-R_1, -OR_1, -OCOR_1,$
 7 $-SR_1, -F, -NHR_2, -Br, \text{ or } -I$; and R_g is $-R_1,$
 8 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or
 9 $-C\equiv CH$;

10 or

11 B) each $R_a, R_b, R_c, R_f, R_k, R_l$, independently
 12 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
 13 or $-I$; and each $R_d, R_e, R_i, R_j, R_m, R_o$
 14 independently is $=O, -R_1, -OR_1, -OCOR_1,$
 15 $-SR_1, -F, -NHR_2, -Br, -I$; and R_g is $=O,$
 16 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$
 17 or $-C\equiv CH$;

18 and

19 II. Z is defined as follows:

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21

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A) Z is Y , where Y is $-O-, \overset{R_1}{|} -N-, >CHR_1,$

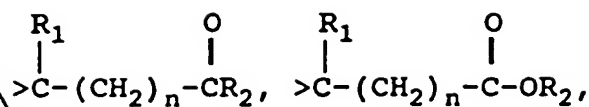
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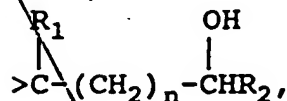
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$\overset{R_1}{|} >C=O, >C-(CH_2)_nOR_2,$

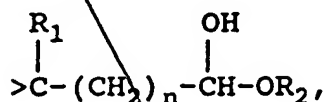
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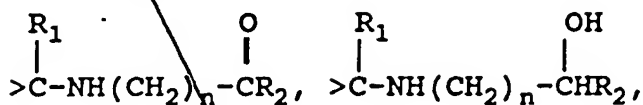
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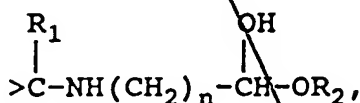
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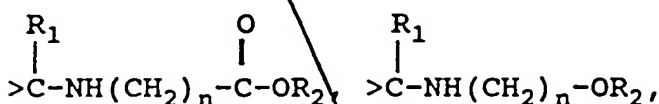
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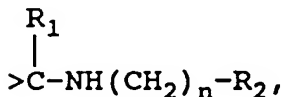
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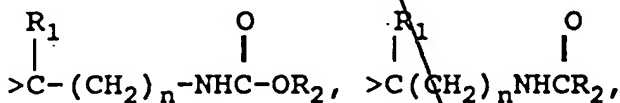
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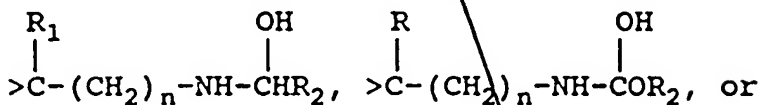
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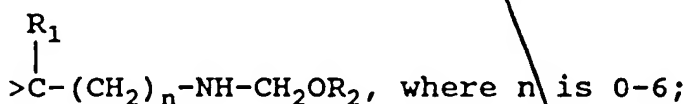
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57 or

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B) Z is $\begin{array}{c} -Y-CH- \\ | \\ R_n \end{array}$ or $\begin{array}{c} -CH-Y- \\ | \\ R_n \end{array}$, where R_n

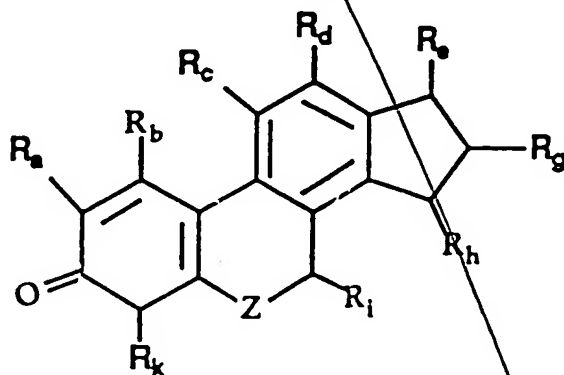
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is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

62 where, in each formula set forth above, each R_1 and R_2
63 independently is -H, or substituted or unsubstituted alkyl,
64 alkenyl or alkynyl group of 1-6 carbons.

1 10. A compound of the general formula below, said
2 compound being a cell-mitosis-inhibiting compound:

3



4 wherein:

5 I. R_a - R_k are defined as follows:

6 A) each R_a , R_b , R_c , R_d , R_g , R_h , R_i , R_k
7 independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$,
8 $-F$, $-NHR_1$, $-Br$, or $-I$; and R_e is $-R_1$, $-OR_1$,
9 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

10 or

11 B) each R_a , R_b , R_c , R_d , independently is $-R_1$,
12 $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, or $-I$;
13 and each R_g , R_h , R_i , R_k independently is
14 $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$
15 or $-I$; and R_e is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$,
16 $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

17 II. Z is defined as follows:

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19
20

1) Z is Y, where Y is $-O-$, $-N-$, $\begin{array}{c} R_1 \\ | \end{array}$, $>CHR_1$,

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23

$$>C=O, \quad \begin{array}{c} R_1 \\ | \\ >C-(CH_2)_nOR_2, \end{array}$$

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26

$$\begin{array}{c} \text{R}_1 \\ | \\ >\text{C}-(\text{CH}_2)_n-\text{CR}_2, \end{array} \quad \begin{array}{c} \text{O} \\ | \\ \text{R}_1 \\ | \\ >\text{C}-(\text{CH}_2)_n-\text{C}-\text{OR}_2, \end{array}$$

52
53
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Z is $-Y-CH-$ or $-CH-Y-$, where R_n
 $\begin{array}{c} | \\ R_n \end{array}$ $\begin{array}{c} | \\ R_n \end{array}$

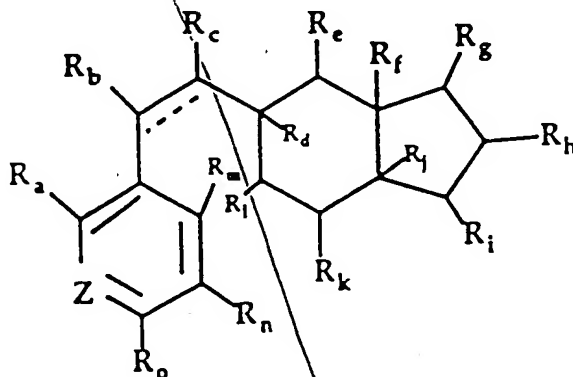
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is $-R_1$, $-OR_1$, $-SR_1$, $-F$,
 $-NHR_2$, $-Br$ or $-I$;

57 where, in each formula set forth above, each R_1 and R_2
 58 independently is $-H$, or substituted or unsubstituted alkyl,
 59 alkenyl or alkynyl group of 1-6 carbons.

1
2
3

11. A compound of the general formula below, said
 compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I. R_a-R_o are defined as follows:

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7
8
9
10

A) each R_a , R_b , R_c , R_d , R_e , R_f , R_g , R_h , R_j , R_k ,
 R_l , R_m , R_n , R_o independently is $-R_1$, $-OR_1$,
 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i
 is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$,
 $-I$ or $-C\equiv CH$;

11 or

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17

18

19 or

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B) each $R_a, R_d, R_f, R_j, R_m, R_n, R_o$ independently is $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, -I$; and each $R_b, R_c, R_e, R_g, R_h, R_k, R_l$ independently is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$; and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

27 and

28 I. Z is defined as follows:

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30

31

1) Z is X, where X is $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1, >\overset{O}{\underset{|}{CC}}-OR_1,$

32

33

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$\overset{OH}{\underset{|}{>CC}}-R_1, \overset{OH}{\underset{|}{>CC}}-OR_1$; or

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36
37

$$Z \text{ is } \begin{array}{c} \text{=C-X'-} \\ | \\ R_p \end{array} \text{ or } \begin{array}{c} \text{-X'-C=} \\ | \\ R_p \end{array}, \text{ where } R_p$$

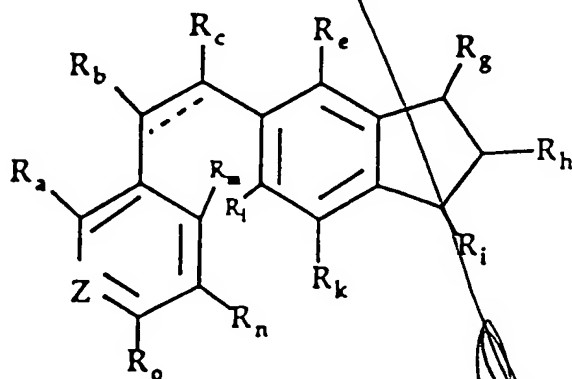
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is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;
and X' is X , as defined above;
or X' is $>C=O$;

41 where, in each formula set forth above, each R_1 and R_2
42 independently is -H, or substituted or unsubstituted alkyl,
43 alkenyl or alkynyl group of 1-6 carbons; and the bond
44 indicated by $C \bullet \bullet \bullet C$ is absent or, in combination with the $C-C$
45 bond is the unit $HC=CH$.

1
2
3

12. A compound of the general formula below, said compound being a cell-mitosis-inhibiting compound:



4 wherein:

- 5 I. R_a-R_o are defined as follows:
- 6 A) each $R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n,$
 7 R_o independently is $-R_1, -OR_1, OCOR_1, -SR_1,$
 8 $-F, -NHR_2, -Br, \text{ or } -I$; and R_l is $-R_1, -OR_1,$
 9 $-OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or $-C\equiv CH$;
- 10 or
- 11 B) each $R_a, R_e, R_l, R_m, R_n, R_o$ independently
 12 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
 13 $-I$; and each R_b, R_c, R_g, R_h is $=O, -R_1,$
 14 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$;
 15 and R_l is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$
 16 $-NHR_1, -Br, -I$ or $-C\equiv CH$;
- 17 or
- 18 C) each $R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o$
 19 independently is $-R_1, -OR_1, OCOR_1, -SR_1,$
 20 $-F, -NHR_2, -Br, -I$; and each R_g, R_h
 21 independently is $=O, -R_1, -OR_1, -OCOR_1,$
 22 $-SR_1, -F, -NHR_1, -Br$ or $-I$; and R_l is $=O,$
 23 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$
 24 or $-C\equiv CH$;
- 25 and
- 26 II. Z is defined as follows:
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- 28
- 29 A) Z is X , where X is $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1, >\overset{O}{\underset{|}{CC}}-OR_1,$
- 30 $>\overset{OH}{\underset{|}{CC}}-R_1, >\overset{OH}{\underset{|}{CC}}-OR;$
- 31
- 32
- 33 or
- 34 B) Z is $=C-X'-$ or $-X'-C=$, where R_p
- 35 $\underset{|}{R_p}$ $\underset{|}{R_p}$
- 36

37 is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$,
 38 and X' is X , as defined above;
 39 or X' is $=O$;
 40 where, in each formula set forth above, each R_1 and R_2
 41 independently is $-H$, or substituted or unsubstituted alkyl,
 42 alkenyl or alkynyl group of 1-6 carbons; and the bond
 43 indicated by $C \bullet \bullet \bullet C$ is absent or, in combination with the $C-C$
 44 bond is the unit $HC=CH$.

1 13. The method of claim 1, wherein said
 2 cell-mitosis-inhibiting composition is 2-methoxyestradiol.

1 14. The method of claim 1, wherein said
 2 cell-mitosis-inhibiting composition is 2-fluoroestradiol.

1 15. The method of claim 1, wherein said
 2 cell-mitosis-inhibiting composition is 2-bromoestradiol.

1 16. The method of claim 1, wherein said
 2 cell-mitosis-inhibiting composition is 2-methoxyestrone.

1 17. The method of claim 1, wherein said cell-
 2 mitosis-inhibiting composition is 17-ethynylestradiol.

1 18. The method of claims 1 or 2 wherein said
 2 compound is further characterized in that

3 A) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ R_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ R_n \end{array}$; and
 4
 5

6 Z'' is $\begin{array}{c} \text{-Y-CH-} \\ | \\ R_p \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ R_p \end{array}$; or
 7
 8

9 B) Z' is X ; and Z'' is $\begin{array}{c} \text{-Y-CH-} \\ | \\ R_p \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ R_p \end{array}$; or
 10
 11

12 C) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_n \end{array}$; and Z" is Y.
13
14

1 19. The method of claims 3 or 4 wherein said
2 compound is further characterized in that Z is
3 $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_n \end{array}$.
4
5

1 20. The method of claims 5 or 6 wherein said
2 compound is further characterized in that Z is
3 $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$.
4
5

1 21. The compound of claims 7 or 8, wherein said
2 compound is further characterized in that

3 A) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_n \end{array}$; and
4
5

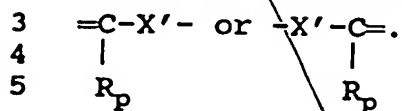
6 Z" is $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_p \end{array}$; or
7
8

9 B) Z' is X; and Z" is $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_p \end{array}$; or
10
11

12 C) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_n \end{array}$; and Z" is Y.
13
14

1 22. The compound of claims 9 or 10, wherein said
2 compound is further characterized in that Z is
3 $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_n \end{array}$.
4
5

1 23. The compound of claims 11 or 12, wherein said
2 compound is further characterized in that Z is



1 24. The method of any one of claims 1-6, wherein at
2 least one of $R_a \rightarrow R_p$ is $-OCH_3$.

1 25. The compound of any one of claims 7-12, wherein
2 at least one of $R_a \rightarrow R_p$ is $-OCH_3$.

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add
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